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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/855,321	05/14/2001	Tuomo Suntola	ASMMC.013C2	9994

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EXAMINER

FULLER, ERIC B

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 03/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/855,321

Applicant(s)

SUNTOLA ET AL.

Examiner

Eric B Fuller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Terminal Disclaimer

The terminal disclaimer filed on November 28, 2003, disclaiming the terminal portion of any patent granted on this application that would extend beyond the expiration date of US 6,015,590, has been reviewed and is accepted. The terminal disclaimer has been recorded and the rejection based on US 6,015,590 has been withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 17, 20-22, 24, and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Sakuma et al. (US 5,270,247).

Sakuma teaches an ALE method that uses purging in between cycles to evacuate the process chamber (column 3, lines 3-40). The evacuation is made as complete as possible (column 5, lines 30-35), which reads on the applicant's claims 20 and 21. Separate inflow paths feed the reactants (column 6, lines 15-20). The reactant is mixed with the inactive (purge) gas prior to entering the chamber (column 6, lines 39-62).

Claims 17-19, 22, 24, 25, and 32-35 are rejected under 35 U.S.C. 102(e) as being anticipated by Yokoyama et al. (US 5,483,919).

Yokoyama teaches an ALE process that uses a purge gas to evacuate the process chamber. The reactant is fed to fill the reaction space and the purging step lasts three times longer (column 4, lines 5-10). Separate inflow paths feed the reactants (figure 1). The reactant is mixed with an inactive (carrier) gas prior to entering the chamber (column 4, lines 40-50).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 26-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakuma et al. (US 5,270,247) or Yokoyama et al. (US 5,483,919), as applied to claim 17 above, and further in view of Moore, Sr. (US 3,662,583).

Sakuma and Yokoyama, both, independently teach the limitations to claim 17. Both references are silent to the use of oblong feed pipes. However, Moore teaches that using oblong feed types for feed a process space provides a wider spread of feed gas, such that the process space may be reduced. One of skill in the art would recognize that a smaller process space would result in less feed gas and process/evacuation times required. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize oblong feed pipes in the processes of either Sakuma or Yokoyama. By doing so, the volume of the process chamber may be reduced, resulting in less feed gas required and smaller process/evacuation times.

Claims 18, 19, 23, and 33-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakuma et al. (US 5,270,247).

As to claims 18, 19, and 33-35, Sakuma teaches the limitations of claim 17, but is silent to the degree of evacuation. However, it is taught that the purging should be long enough such that the evacuation is as complete as possible without removing any reactants from the substrate surface (column 5, lines 30-60). To determine this amount

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would have been within the skill of one practicing in the art, through routine experimentation. As to claim 23, to determine the capacity of the pump would have also been within the skill of one practicing in the art to achieve this desired amount of evacuation.

As to claims 36-40, it has been discussed above how it would have been obvious to one of ordinary skill to minimize the volume of the process chamber such that less feed gas is required and smaller process/evacuation times are realized. Therefore, to determine what these dimensions are, while still performing the process with success, would have been within the skill of one practicing in the art, through routine experimentation.

As to claims 41-43, the reference fails to explicitly teach purging the second feed line while the first reactant is flowed through the first feed line, and vice-versa. However, the reference does teach that the purge is used to prevent the two feed gases from ever coming into contact with each other. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to purge the feed lines that are not feeding reactants, when other feed lines are being utilized. By doing so, contamination of the reactant source with the other reactants is prevented.

Response to Arguments

Applicant argues that Sakuma fails to teach that the entire gas volume of the reaction chamber is evacuated. This is not found persuasive. The claims do not require that "the entire gas volume of the reaction chamber" be evacuated. Although

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the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The claims read, "a gas volume of the reaction space is evacuated essentially totally...". This is not the same as the entire gas volume of the reaction chamber. First, the claims read that a *volume* of the reaction space is entirely evacuated, not that the *entire* volume is entirely evacuated. Sakuma reads on this. Secondly, the claims read that the reaction *space* is evacuated, not the reaction *chamber*. For an ALD process, such as that taught by Sakuma, the reaction is a surface reaction. Thus, the reaction space is only the area immediately above the substrate. Sakuma anticipates evacuating reactant gas from this space.

The applicant also argues that the purge time is minimized and alleges that this means that the purge is not complete. This is not found persuasive. The reference teaches that purging is efficient so that it is *more complete* in less time (column 5, lines 30-35). The reactants are "purged away" (column 3, lines 45-55). This at least reads on the applicant's claim of a volume of the reaction space being completely evacuated. In combination with the chamber being a vacuum chamber, this reads on the entire chamber being "essentially totally" evacuated.

The positions presented above pertain to applicant's arguments based on Yokoyama. Particularly, the claims read, "a gas volume" or "3-10 gas volumes". These volume sizes are arbitrary. The claims do not require that the volumes be the entire volume of the reaction chamber. Additionally, evacuation may mean purging or just lowering the pressure of the chamber to near vacuum, according to the specification. In

the embodiments of lowering the pressure, it is not understood how a volume that is 3-10 times greater than the volume of the entire chamber can be evacuated from the chamber.

Additionally, arguments made in view of the relative sizes of the figures in the reference are not convincing. There is no indication that the figures are drawn to scale.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (571) 272-1420. The examiner can normally be reached on Mondays through Thursdays.

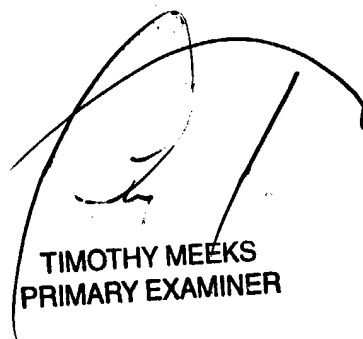
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P Beck, can be reached at (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



EBF



TIMOTHY MEEKS
PRIMARY EXAMINER